

Claims

1. A method of preparing titanium aquo-oxo chloride,
5 characterized in that it consists in hydrolyzing TiOCl_2 either in an atmosphere whose moisture content is maintained between 50 and 60%, or by an alkali metal carbonate A_2CO_3 .
- 10 2. The method as claimed in claim 1, characterized in that the TiOCl_2 is in the form of an aqueous $\text{TiOCl}_2 \cdot y\text{HCl}$ solution.
3. The method as claimed in claim 2, characterized in
15 that the HCl concentration of the solution is about 2M.
4. The method as claimed in claim 2, characterized in that the $\text{TiOCl}_2 \cdot y\text{HCl}$ concentration is between 4M and 5.5M.
- 20 5. The method as claimed in claim 2, characterized in that the $\text{TiOCl}_2 \cdot y\text{HCl}$ solution is placed at room temperature above an $\text{H}_2\text{SO}_4/\text{H}_2\text{O}$ mixture in respective amounts such that the relative humidity is around 50 to
25 60% and left in contact therewith for about five weeks.
6. The method as claimed in claim 1, characterized in that a $\text{TiOCl}_2 \cdot y\text{HCl}$ solution is brought into contact at room temperature with an alkali metal carbonate A_2CO_3 in
30 respective amounts such that the Ti/A ratio is 4 ± 0.5 and left in contact therewith for 48 to 72 hours.
7. The method as claimed in claim 6, characterized in that $\text{Ti/A} = 4 \pm 0.1$.
- 35 8. A titanium aquo-oxo chloride in the form of crystals having the following composition by weight: 26.91% Ti; 21.36% Cl; and 4.41% H, which corresponds to

the formula $[\text{Ti}_8\text{O}_{12}(\text{H}_2\text{O})_{24}]\text{Cl}_8 \cdot \text{HCl} \cdot 7\text{H}_2\text{O}$, characterized in that it has a monoclinic structure with the following monoclinic cell parameters: $a = 20,3152(11) \text{ \AA}$, $b = 11.718(7) \text{ \AA}$, $c = 24.2606(16) \text{ \AA}$, $\beta = 111.136(7)^\circ$,
5 and the Cc symmetry group.

9. The titanium aquo-oxo chloride in the form of crystals as claimed in claim 8, characterized in that it is formed from monodisperse particles in a polar
10 solvent.

10. The titanium aquo-oxo chloride as claimed in claim 9, characterized in that said particles have a hydrodynamic diameter centered around 2.2 nm.
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11. The titanium aquo-oxo chloride as claimed in claim 8, characterized in that it is in the form of a thin film on a substrate.

20 12. The titanium aquo-oxo chloride as claimed in claim 11, characterized in that the substrate is made of glass.

25 13. A semiconductor element characterized in that it is formed by a titanium aquo-oxo chloride as claimed in either of claims 11 and 12.

30 14. A method of purifying air by photocatalysis, characterized in that the catalyst is a titanium aquo-oxo chloride as claimed in either of claims 11 and 12.

35 15. A method of purifying aqueous effluents by photocatalysis, characterized in that the catalyst is a titanium aquo-oxo chloride as claimed in either of claims 11 and 12.